See What You've Been Missing

Cut Fancy, Complicated Case Windows

Case windows are an overlooked area of PC modding. Certainly, countless modders have installed circular, oval, or rectangular windows in their cases, but these are usually simply a way to view the "real" mods inside the computer, whether it's a cold-cathode light system or a Lego village nestled between the power supply and video card.

But it doesn't have to be this way; you can make your system's window the main attraction. By etching an image in the window or cutting the computer case's side panel to create a silhouette image, the window itself can be the centerpiece of your computer's case, a masterpiece worthy of oohs and aahs.

"Do-it-yourself modders shine doing intricate water-cooler systems, automobile paint, and so on," says Chris Francy, owner of Xoxide.com, which sells computer case modification supplies. But windows, he says, are often an afterthought.

There are generally three parts to creating your own PC case window, any or all of which you might implement in your design. First, there's cutting the case to create a space for the window. The shape might be a complex image that will show through the window as a silhouette, or something as basic as a circle or square. Second is cutting out the window itself from a large piece of acrylic. Finally, you can etch an image into the acrylic.

Modders generally use acrylic, rather than glass, windows. Acrylic is lighter and sturdier than glass. In addition, it is less expensive than tempered glass and easier to etch.

Hand-Cut The Case

First, we'll look at cutting an opening in the case. Most windows are cut into the left side of the PC case because that's where the most interesting view is. (A window on the right side would show only the tray that secures the motherboard.) You can also install a window on top of the case, perhaps between the power supply and the CD-ROM drive, for a top-down view into the computer. Although we'll assume that you're doing the left-side panel, the techniques discussed here will work for windows in any location.

The most common way to cut the panel or top of a PC case is the hands-on method: using a combination of power tools and metal files to create your work of art.

A jigsaw and a power rotary cutting tool, such as the ever-popular Dremel, are the most useful tools for cutting. If you can, have both tools at your disposal. "It's good to have the choice between the two," says Nick Curtiss, owner of the modder Web site CrazyPC (www.crazypc.com). "If you had to go with one or the other, it's a hard choice. For straight lines and arcing curves, a jigsaw works a lot better. The Dremel, withlittle cutting wheels, is best for highly detailed work, but they are hard to cut with. The Dremel might be more useful overall, but those cutting wheels can be tricky. I've seem them skip because of the high RPM, and that's when mistakes happen."

In addition to the power tools, Curtiss recommends using a set of small files for detail work. "I use a hobby file set; the files have different shapes to get into the nooks and crannies."

Carefully consider the canvas that you'll be using—that is, the type of metal the PC case is made from. Aluminum is much easier to work with than steel. "Steel cases are a lot harder to cut and more difficult to touch up afterwards," Curtiss says.

Although the results can be worth it, cutting by hand takes time. Aaron Daugherty (tokos.eskapoza.com) used two rotary cutters, a Ryobi multitool and a Roto-Zip, to create a unique opening for his custom case. The process took about 80 hours. "Cutting this design with the Roto-Zip caused the metal to heat up and warp as I was working, making for slow and precarious progress," he says.

How do you get the image onto the side of a PC case for cutting? You could draw directly on the case in pencil or cut out a cardboard template and trace the design on the case panel. For the best results, though, Curtiss suggests not drawing or cutting directly on the metal, which can lead to scrapes and other damage. "We use a contact paper that's got almost the tackiness of a Post-It. It comes in big rolls; we roll it out onto the whole panel and do the drawing on that," he says.

An alternate method is to cover the PC case panel in painter's tape, a type of easily removable masking tape. "You can put that on in strips and do your drawing on that," he says. Whatever method you choose, be sure that the drawing surface is sticky enough that it won't move during drawing or cutting.

Tracing paper can be a useful tool for getting the image onto the case panel for cutting. If you've designed an image

using a drawing application, for instance, print out the image at full size. Trace the image with pencil onto the tracing paper. Then, place that on top of the computer panel's protective surface and rub the tracing paper to transfer the image.

It doesn't matter which side of the panel that you place the image on, or which side of the panel you cut. If you cut from the inside, remember to reverse the image. Either way, make sure the outside of the case is protected; if the panel rubs against your working surface, you can scratch the paint or otherwise mar your handiwork.

When you're through cutting, the edges of the case opening will be sharp. Use a metal file to deburr the edges so they're smooth.

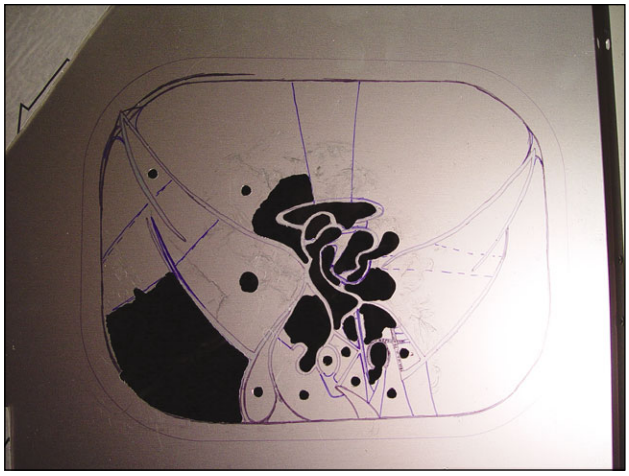
Laser Surgery

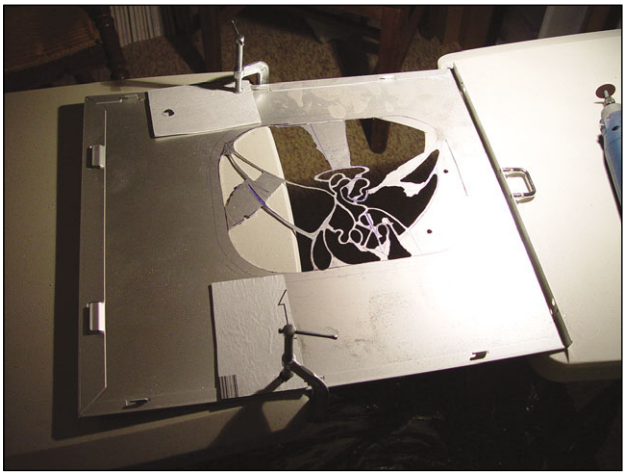
For creating more intricate or geometric designs, some modders bring out the big guns: a powerful laser that will slice right through the aluminum or steel of a PC case. A laser-cut design can be "more intricate than you can possibly get with hand tools," Xoxide.com's Francy says.

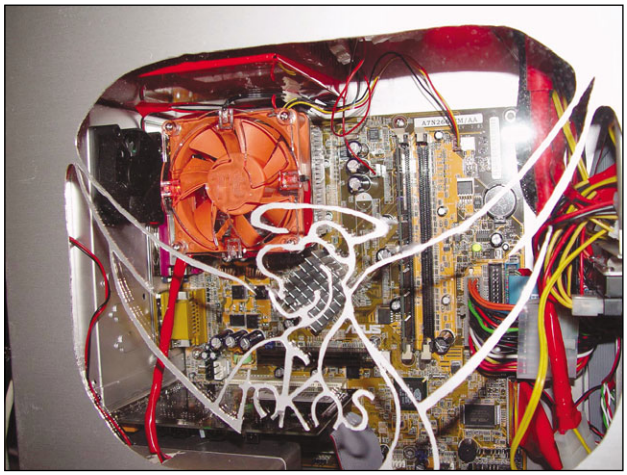
Of course, laser cutting isn't better for every modding situation. CrazyPC-.com's Curtiss prefers hand-cutting tools for highly detailed work, and for organic images such as of a person or a tree. Laser cutting is preferable for geometric designs where small flaws would be more noticeable.

Laser cutters can do two tricks that are of particular interest to case modders. First, they can slice with perfect accuracy though a PC's metal panel. Second, they can etch designs into an acrylic window. Etching creates shallow crevices in the plastic sheet that you can form into any design imaginable.

Check your Yellow Pages for a local business that does laser cutting. (Search for metal works shops and fabrication.) If you don't live in a metropolitan area, chances are you won't find one. In that case, find a business online that can do the laser cutting for you. You'll have to ship your case's side panel or the acrylic sheet to them, but it should only cost a few dollars.







Aaron Daugherty created this angel motif opening in about 80 hours. He drew the image directly on the panel then drilled pilot holes in the areas that he wanted to remove with the Roto-Zip. In the second picture, he switched to the Dremel tool for the finer work. Because of the thin metal strips in the design, "it became really tricky to keep the piece together while working on it." Finally, take a look at the finished product in the bottom photo.

Because a computer controls the laser, you can create and send a digital file describing the design. Many businesses that offer laser cutting can accept your design in a variety of file formats, including EPS, Adobe Illustrator, and Corel. Before you invest hours and hours designing your case or acrylic engraving, be sure that the company you hire can read the file format that you plan to use.

Be sure to use a vector-based drawing program to create your masterpiece. "Most places are able to use Adobe Illustrator, and a lot of other programs support exporting to that format," Curtiss says. A key to creating a design for laser cutting is to not cross lines: Think in terms of drawing a silhouette or carving a jack-o-lantern.

Also talk to the company about the type of curves that will look best, which can depend on the capabilities of their software and cutting machine. "As long as you stick with Bezier curves and straight lines you should be OK. More complex curves don't translate well," Francy says.

The biggest drawback to laser cutting a case panel is the cost, which can be prohibitively expensive. Although the exact price for your project will depend on how intricate your design is, many computer case laser jobs cost around $200. Firms usually charge based on the amount of laser time ($1 per minute is typical) plus a setup fee. "Doing your name might take five minutes. An American eagle coasting over the sky could take an hour," says Mike Ryan, owner of Ryan Screen Printing (ryanscreenprinting.com), a company that does custom laser cutting.

There's another option for cutting case windows: water jet cutting. This technology uses a high-powered, computer-controlled stream of water to slice though material. Cutter beware: There are two types of water jet, regular and abrasive. Abrasive cutters use water plus additional abrasives to cut through thicker, stronger materials, while regular water jets (without abrasives) are limited to softer materials. A regular water jet could cut though a thin aluminum panel, but not a steel one, and could leave ragged edges. Abrasive water jet cutting does have some advantages compared to laser cutting. In particular, it can cut highly reflective materials and can be less expensive. If a machine shop in your area offers abrasive water jet cutting, it may be a less expensive option to laser cutting.

Cutting The Acrylic

You can use the same tools—both power tools and laser—to cut a case window from a larger sheet of acrylic. But instead of bothering, many modders simply buy precut acrylic sheets from online stores specializing in case mods. They're available in many basic shapes, sizes, and colors. Even if you're a hardcore, do-it-yourself PC case modder, there's no shame in buying a precut window for your case because cutting it yourself can be more expensive and doesn't add any value.

Most acrylic sheets come from the factory with sticky paper coating both sides. If you'll be cutting the acrylic yourself, don't remove this protective coating until after you cut the window in your PC. Even if you've chosen a precut window, it's a good idea to leave the paper on for as long as possible to keep it scratch-free.

Come Upstairs & See My Etchings

If cutting an intricate design in metal doesn't suit your style or ability level, you can still create a wonderful window by etching the acrylic itself. Window etching is perhaps the most straightforward part of modding a PC case

Bret Daly, editor of moddershq.net, created this Nightmare Before Christmas etching using a Dremel tool. The art is illuminated by four high-intensity LEDs.

Bret Daly also created this raven window etching, a tribute to Edgar Allan Poe's famous poem.

window. Simply use a rotary cutter such as a Dremel to dig a fraction of an inch into the plastic, which changes the material from clear to opaque.

Etching a case window can be a good place to start for nervous first-time experimenters. From a financial standpoint, creating a window etching is the most forgiving window modding tweak. If you manage to ruin the acrylic sheet, you're only out a few dollars for a replacement window. Most modders can live with that.

You can draw the design on the acrylic using a grease pencil or trace the image from a graphic located underneath the window. Then go to work with the cutting tool. You can etch on either the inside or the outside of the case window. If you put the image on the inner side of the acrylic sheet, which will create a smooth feel on the outside of the window, don't forget to reverse the image.

To make the etched design stand out in a darkened room, you can drill holes in the computer-facing side of the acrylic, and install LEDs in those holes. If the LEDs are located behind the metal edge of the case, you won't be able to see them directly, but they will brilliantly illuminate the etched design. You can use white LEDs, color LEDs, or a combination to get the perfect effect. Although the best placement and number of lights will depend on your particular window design, many modders find the top and bottom, or left and right edges, of the acrylic are the best positions for LEDs. Create divots in the edge of the acrylic that fit the heads of the LEDs snugly and then mount them in place. Use epoxy to affix the LEDs in place, and then connect them to a power source.

"We have done cases where we've etched a design in acrylic and cut several small holes in which we embed high-intensity LEDs to light it up," Ryan says. "We use 3/16-inch acrylic, it's a real strong material."

Installing The Window

You have the window, you have the opening, now you just need to put the two together.

When installing a case window in a simple circular or round-corner rectangle opening, modders typically use a flexible rubber gasket between the inside edge of

This case panel's geometric design was created with a laser cutter.

the case panel and the acrylic window. The rubber molding grips the edge of the panel and the window, holding them tightly together.

Because holes created with electric saw, rotary cutter, or other hand tools can be razor sharp, the molding is also important to keep people from getting hurt (and keeping blood off of your custom case). This system doesn't work with intricate openings, however. The rubber molding requires rounded corners; the molding is too thick to follow tight angles.

The solution is to use acrylic that is larger than the dimensions of the opening in the case, and affix it inside the case panel. You'll need a way to hold the window to the side panel, just behind the hole. The most common option, according to Francy, is surprisingly low-tech: epoxy. Just put some of the sticky stuff between the inside wall of the case and the acrylic, and it will stick. This provides a clean, finished look, but it may not be possible to remove the acrylic sheet once it is affixed. Be careful not to use too much, or the epoxy will seep out from under the metal and be visible on the window.

Curtiss recommends using 3M Adhesive Sheets, a type of clear plastic that is sticky on both sides. Adhere one side to the inside of the PC case before you do any cutting. After the cutting is done, peel away the protective cover on the other side of the adhesive sheet, and then stick the acrylic sheet to it. In the end result, even the thinnest strips of metal will be affixed firmly to the window, without any rattling or flapping. "That's the nicest, cleanest way to do it," he says.

Another choice is to use heavy-duty Velcro on the inside of the computer case and acrylic window. It is simple to do and makes it easy to swap case windows on a whim. However, it won't provide the tightest fit and will let dust in and noise out of your computer.

The factory-installed windows in "premodded" cases are usually bolted on. Lag bolts, available in any hardware store, provide a similar smooth, finished look. This is another option for the do-it-yourself modder, but not an easy one. You'll have to drill carefully aligned holes in the case and plastic and cut the bolts to the right length. "Bolting is not something people typically do on their own," Francy says.

Yet another option is to use a rivet gun, available in hardware stores, to affix the acrylic sheet to the case. To use rivets, drill holes though the PC's case panel and acrylic window, then insert "pop rivets" into the hole. Next you'll use the rivet gun. Pull the trigger tightly to snap the two materials together. The rivets will be visible, but they're available in different colors so you may be able to incorporate them into the design of the case.

Remember, if you're installing a window with rubber molding, the acrylic sheet should have a just-slightly smaller diameter than the opening. If you're installing the window behind the opening, the acrylic should exceed the dimensions of the hole by an inch or more, depending on how you will be mounting it.

Your Window To The World

If you need more inspiration, explore the Web's computer case mod galleries, which display wonderful examples of window dressing. Start with www.coolcasegallery.net, the forums at www.twistedmods.com, and www.modthebox.com.

As you dream of the modifications that will turn your PC case into an astounding showpiece of light and color, don't forget about the window. That pane of acrylic doesn't have to be merely a window onto the great-looking technology inside the computer, it can be a showpiece itself. With the proper tools, an investment of time, and a good dose of creative spark, you can create a case window that is a unique masterpiece. CPU

by Kevin Savetz

Care & Feeding Of An Acrylic Window

Installing a window means cleaning and maintaining that window. If the windows in your living space are covered in grime or spider webs, perhaps caring for a windowed PC case will be too much of a commitment. Then again, hard-core geeks who spend more time looking at the computer than out the window may keep their PC windows in better condition.

First and foremost, you'll want to keep it clean and free of abrasions. Acrylic can scratch, so treat your window with care. Swirl and scratch remover, available at your local auto parts store, can make minor marks and nicks disappear and add a like-new sheen to the window.

To clean the window, pour warm water onto a lint-free cloth (such as for cleaning eyeglasses). Or, use a product specifically meant for cleaning acrylic. Never use any product that contains ammonia or alcohol to clean an acrylic window: They can permanently fog it. This rules out most household glass cleaners.

No one wants a window that looks in on dustbunnyville, and dust loves to collect inside PC cases. You'll need to open the case from time to time to clear it of dust bunnies and other detritus that your system's cooling fans pull in. ▲